UK medical students' perspectives on practical prescribing teaching and learning provisions: a cross-sectional survey

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UK medical students' perspectives on practical prescribing teaching and learning provisions:

A cross-sectional survey

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Abstract

Purpose: To determine medical students' perspectives on the provision for the teaching and learning of processes that lead to and include the writing of a clear, safe and legal prescription (practical prescribing) in UK medical schools.

Methods: We designed a cross-sectional survey of UK medical students in years 3, 4 and 5. Students were asked about their experiences and views of practical prescribing teaching and learning they had encountered on their medical course.

Results: 1023 medical students responded (7% response rate), from 25 UK medical schools: 22%, 37% and 41% in the third, fourth and final years respectively. Teaching of practical prescribing was widespread, with 94.3% of final year (n=396, 95% Confidence Interval [CI]=92-97%), 86.8% of fourth year (n=328, CI=83-90%) and 73.8% of third year students (n=166, CI=67-80%) reporting they had received it. Availability of this teaching appeared to vary by medical school.

Self-directed learning was the most frequently reported mode of delivery (90.9%, n=809). Validated preprescribing and simulation were perceived by students in each year group as the most effective method. Clinical pharmacologists, clinical pharmacists and junior doctors were perceived by the students as being the most effective professional groups at teaching practical prescribing.

Conclusions: UK medical students reported a variety of methods utilised in the teaching and learning of practical prescribing. However, methods they perceived to be very effective (simulation and pre-prescribing) do not appear to be widely available or are only reserved for the final year of study. Combining such methods with involvement of professional groups perceived to be most effective should be explored.

Key words: Prescribing, medical students, medical education, pharmacology

Introduction

Prescribing is a multifarious process, often performed in a complex and dynamic environment. As a result, prescribers often follow guidance that might facilitate the safe and effective use of medicines (1). Despite keen interest in this subject area, prescribing errors remain a significant issue, regardless of the grade of doctor involved (2,3). This has prompted international organisations to develop mitigating strategies that might begin to minimise prescribing errors (4,5). Notably, junior doctors not only feel underprepared but also have the highest prescribing error rate in UK hospitals. [2, 6, 7]. Furthermore, medical students have insufficient competencies to be able to prescribe safely and effectively [8, 9].

A study was undertaken in 2008 to investigate the patterns of learning at UK medical schools and student/recent graduate views regarding preparedness to prescribe [9]. Although this study highlighted the perceived lack of learning opportunities available to medical students in relation to prescribing in UK medical schools, it did not investigate specifically which teaching and learning methods that medical students were exposed to, nor how effective students perceived these to be in improving their confidence or competence in practical skill acquisition. There is a recognised correlation between student engagement and positive outcomes on student development and achievement/success [10]. Therefore, the importance of student voice in curricular development cannot be overstated.

Undergraduate medical education in the UK has undergone many changes over the years, rendering disciplines such as clinical pharmacology and therapeutics (CPT) less visible in the curriculum, in favour of more integrated approaches [11]. Integration was appropriate to lessen factual burden on students, but it has been suggested that such changes may have inadvertently affected the practicality of consolidating the fundamentals of CPT necessary to safely prescribe [12,13]. It is unclear what the effects, if any, these changes have had on prescribing error rates in practice.

The variation in the teaching of CPT on medical undergraduate courses has been highlighted [14, 15], but to date the provision for the teaching and learning of practical prescribing specifically has not been studied. Practical prescribing encompasses processes that lead to and include the writing of a clear, safe and legal prescription and the teaching and learning of this helps bridge the gap between theory and clinical practice.

Dornan et al stressed the importance of education in addressing the issue of prescribing errors [2] and educational interventions have been developed. However, the long-term efficacy of these interventions remains to be proven.

Student feedback is also an important aspect of quality assurance and development of established curricula, and is now commonplace in higher education [16]. Obtaining perspectives of current medical students on the teaching and learning methods employed in practical prescribing may highlight the practices that best facilitate preparation for clinical practice. Medical schools could then use this analytical feedback to enhance teaching and learning on the subject. This student engagement could be utilised to develop minimum standards for a programme of study for practical prescribing teaching and learning for use in the undergraduate domain.

This study aimed to determine, from a student perspective, the provision for the teaching and learning of practical prescribing in UK medical schools. Furthermore, it attempted to elicit how effective students perceived these provisions to be.

Methods:

Study Design

A cross-sectional survey of UK medical students, on their perspectives of the provision for teaching and learning of practical prescribing, was performed.

Questionnaire design and administration

An online questionnaire was available for completion from November 2014 to May 2015 using the Bristol Online Surveys (BoS) software. This time frame chosen to ensure that the students were settled into their year group. A brief description of the study and link to the questionnaire were sent via e-mail to the undergraduate lead at each of the 33 UK medical schools for dissemination to all students in their third, fourth or final year of an undergraduate medical degree. It was thought that these students could give a more reliable account of practical prescribing teaching and learning throughout the undergraduate course. Participation was voluntary. The invitational email stated that completion and submission of a response assumed informed consent. Reminder emails were sent to the undergraduate leads at fortnightly intervals for the first two months and at monthly intervals thereafter.

The questionnaire contained 17 mandatory questions relating to the teaching and learning of practical prescribing at the medical school where students were based. The questions were centred around teaching and learning methods reported in the literature [17] and those commonly used in higher education. Questions explored which teaching

methods are utilised, who is responsible for delivering this teaching and how effective students perceive these to be in helping them to develop their practical prescribing skills (Appendix 1).

There was no validated questionnaire available for reference, so questionnaires used in a similar study in the postgraduate setting were used as a template [18]. Once developed, prior to distribution, the questionnaire was piloted and validated internally at Brighton and Sussex Medical School by five students and five staff of the department of medical education, who were not directly involved in the study. The main purpose of the pilot was to test for usability, readability and to identify the approximate timings required to complete the questionnaire.
There was no significant change to the questionnaire after the pilot.

Data management and analysis

Completed questionnaire responses were stored electronically in a password protected BoS account, before being transferred to Microsoft Excel for descriptive statistics to be performed. Kruskal-Wallis tests for non-parametric data were conducted using SPSS [version 22] to explore differences between year groups.

Ethics

The Research Governance and Ethics Committee at Brighton and Sussex Medical School granted ethical approval for the study (reference 14/015/OKO).

Results:

Five medical schools had a policy not to send questionnaires to their medical undergraduate cohort. Two medical schools were listed separately in the questionnaire but their responses were pooled for analysis as their provisions for undergraduate teaching are under the auspices of one organisation.

A total of 1023 medical undergraduates from 25 UK medical schools responded - an approximate response rate of 7%, based on GMC annual medical school return and the Higher Education Funding Council for England data: comprising 225 year 3 (22%), 378 year 4 (37%) and 420 final year (41%)students. The mean number of respondents

from each medical school was 41±33 (SD, n=25), and only 5 medical schools had less than 10 respondents each. The responses from students from these 5 medical schools were pooled for analysis in order to reduce the risk of bias.

The majority (94.3%) of final year medical students reported that there was teaching and learning in practical prescribing on their course (n=396, 95% Confidence Interval [CI] = 92-97%), with 86.8% of fourth years (n=328, CI=83-90%) and 73.8% of third years (n=166. CI=67-80%) reporting the same. 5.7% of final year students (n=24) reported that they did not get taught any practical prescribing on their course or did not know if it would be provided. A comparison of proportion of students that have practical prescribing teaching and learning in different medical schools at and different year groups of their undergraduate medical degree is shown in Figure 1.

What are the teaching and learning methods?

Of the students who reported receiving practical prescribing teaching at their medical school, 65.1% (n=579, CI=61-69%) also reported that this teaching was provided using an integrated approach. Figure 2 shows a comparison of the approaches adopted by the various medical schools. This trend was consistent across the year groups with 66.3% of third year (n=110), 66.5% of fourth year (n=218) and 63.4% of final year (n=251) students reporting the use of integration.

Students reported that their medical schools utilised a variety of educational methods for delivering practical prescribing teaching and learning. Self-directed learning was the most frequently reported method (n=809, 90.9%), followed by tutorials (n=786, 88.3%), and pre-prescribing seminars (n=725, 81.5%) [Figure3]. Preprescribing is defined as a controlled process that allows medical students to write instructions on in-patient drug charts [19]. We have referred to the term validated pre-prescribing when, in a clinical setting, a doctor's countersignature is required before drugs are dispensed or administered. At the other end of the scale, provisions by online modules and shadowing clinical pharmacists were scant amongst students with figures of 16.3% (n=145) and 20.2% (n=180) respectively. There was an observed difference with respect to availability across the year groups for some methods e.g. validated pre-prescribing was available to 75% of final years, 52.6% of fourth years and just 37.3% of third years.

Student's perceptions of effectiveness of teaching and learning methods

Students ranked each method in terms of how effective they perceived them to be, a score of 1 being very ineffective and 5 being very effective [Figure 4]. Validated pre-prescribing, simulation and pre-prescribing seminars were perceived as the three most effective methods across all three year groups. Self-directed learning or online resources were considered least useful.

Kruskal-Wallis tests were performed to determine if there were significant differences in median scores of perceived effectiveness across the three year groups. Of the three most effective methods, there was no significant difference found between the perceived effectiveness of pre-prescribing seminars X^2 *(2, N=725) =3.603, p=0.165,* or simulation X^2 *(2, N=254) =1.246, p=0.536*, across the three year groups. There was an observed difference however for validated pre-prescribing X^2 *(2, N=603) =10.096, p=0.006.* Further analysis showed that there were differences between its perceived effectiveness for years 3 and 5 (p=0.003) and year 4 and 5 (p=0.042), with no difference between year 3 and 4 (p=0.168).

Of the other methods there were no differences between peers, shadowing a clinical pharmacist, shadowing a junior doctor or use of apps.

Who provides the practical prescribing teaching?

Foundation doctors in their first (F1) and second year (F2) of postgraduate training were the professional group that the majority of final year students reported as being responsible for providing practical prescribing teaching to them (n=372, 88.6%). Students in their fourth (78.8%; n=298) and third (71.1%; n=160) years of study reported that non-foundation grade doctors (any grade of doctor that is not currently in foundation training i.e. registrar, consultant, GP, etc.) were the professional group responsible for providing this teaching to them most frequently.

Patients were responsible for providing this teaching to less than 10% of students across all three years of study.

Effectiveness of the teachers

Clinical pharmacologists were the professional group with the highest percentage of students in their final year

(n=102, 39.2%) and fourth year (n=71, 37.4%) ranking them as "most effective", while clinical pharmacists had the highest percentage of "most effective" rankings amongst students in their third year (n=29, 28.7%). When considering an overall perceived positive effect ("effective" or "most effective" ranking) little difference was seen between the top four professional groups across the 3 year groups; clinical pharmacologists, clinical pharmacists, practising clinicians, and F1 and F2 doctors [Figure 5]. These were the same four professional groups reported by the students in all years as being responsible for providing practical prescribing teaching most often. Patients were considered the least effective group, with 44.1% of students ranking then ineffective.

Discussion:

This study, for the first time, has explored the provisions for the teaching and learning of practical prescribing and the perceived effectiveness of these provisions by medical students in UK medical schools. Previous studies have tended to focus either on the provisions for CPT or on effectiveness of individual educational interventions introduced to improve prescribing. The importance of utilising student feedback as one aspect for quality assurance in the higher education setting is well established [16], and its use is now widespread. If curricula can encompass methods highly valued by students, this may lead to better engagement, the benefits of which have been discussed above.

The majority of final year medical students (94.3%) reported that there was teaching and learning in practical prescribing. However, considering that prescribing is a fundamental skill for a newly qualified junior doctor, the expectation would be for all final year medical students to have such exposure. It is not clear from this study whether some final year students are not exposed to practical prescribing teaching at all or whether, in fact, the prescribing teaching is integrated into the curriculum in a form that does not make it readily identifiable by the students. Interestingly, a lower proportion (75%) of third year medical students reported that there was teaching and learning in practical prescribing, which suggests that medical schools might be delaying introduction of this until later in the course. However, the optimal phase in the undergraduate curriculum to introduce prescribing teaching and learning remains to be determined and the impact of earlier introduction must be questioned.

Results from our study highlight that an integrated approach for the delivery of practical prescribing teaching at medical schools is predominant over stand-alone modules/ courses (Figure 2). There is a paucity of evidence for the superiority of either approach but is not surprising that medical schools veer towards an integrated approach as this

in line with GMC guidance [11]. However, with an integrated curriculum, aspects relating to the safe and effective use of medicines should still be clearly identifiable [12,13].

There was disparity with respect to the apparent availability of methods of delivery of practical prescribing teaching such as simulation, pre-prescribing on actual drug charts/e-prescribing systems (both validated i.e. prescriptions written by students are checked by an appropriate professional for accuracy, and un-validated i.e. prescriptions written are not checked for accuracy) and shadowing of junior doctors. Medical schools may wish to review the provision of such methods more closely as these were also the ones perceived to be most effective by the students themselves, with students placing particular value in the methods that bridge the gap between theory and clinical application. Although in the current study we determined perceived benefit of the above methods of delivery, their practical value has been proven elsewhere [19-21].

Reassuringly, the four professional groups ranked most effective in delivery of teaching, were the same four groups who students stated were responsible for the delivery of most of the prescribing teaching (Figure 5). One explanation for these findings may be that students benefit most from teaching, which is delivered by individuals in active clinical service; however, there are currently no data available to corroborate this.

The importance of the professional group responsible for delivery of the teaching is unclear from the data obtained, but the emphasis should be on having teachers that possess the appropriate knowledge and experience.
A pragmatic approach is for individual medical schools to decide who is best suited to perform this role locally. One important aspect to be taken from these data is the importance of ensuring that those providing practical prescribing teaching are confident and competent enough to do so. The junior doctors, who were widely reported to be currently involved in this role, should receive specific training to allow them to fulfil this role.

The Shape of Training report, which proposes a framework to train UK doctors to meet the ever changing needs of patients both now and in the future, recommends that full registration for doctors should move to the point of graduation [22]. For this to become a reality, medical schools would need to ensure that their graduates are equipped with the necessary competence and confidence to perform fundamental duties such as safe and effective prescribing, to ensure patient safety remains paramount. The development of a programme of study focused on practical prescribing in medical schools might be an approach to ensuring that all graduates are exposed to a minimum standard of appropriate teaching and learning.

Limitations:

This study is not without its limitations. Although it was not possible to determine an accurate response rate as some medical schools had a ban on disseminating questionnaires to their students, this was low at 7%. For this reason, it is difficult to extrapolate and generalise the results. However, what this study does provide are the views of 1023 UK medical students which might give an insight into the current state of affairs.

The effectiveness of modes of delivery and personnel, were perceived by the students, and not measurable as a hard outcome. However, in terms of curriculum design and improvement the importance of student feedback cannot be overstated. The authors also recognise that teaching and learning methods among medical schools may not be best assessed by a questionnaire of students, who often have (partial) experience of a single system.

Finally, the authors acknowledge that there may be selection bias as the more motivated students may be more likely to respond to these types of questionnaires.

Conclusion:

This study highlights, from students' viewpoint, the teaching and learning methods in practical prescribing in UK medical schools and the methods the medical students perceive to be most effective. Students are exposed to a number of methods, at different stages of their undergraduate course and in the absence of individual error studies it remains difficult to robustly assess the effectiveness of these methods on a long-term basis. There is also an opinion from medical students on the professional groups that are most effective in teaching practical prescribing.

It is not possible to make individual recommendations on the data generated by this study alone but the data could be used in the development of a programme of study for practical prescribing and this might support the notion of the medical education continuum. The research team will also obtain medical school staff perspective of the teaching and learning of practical prescribing. Ultimately, a panel of experts will be formed on the teaching and learning of practical prescribing in an attempt to reach a consensus on the essential content and mode of delivery for such a programme of study with which medical students might engage.

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Contribution of authors

MK, SW, IH and MO contributed to the conception and design of the study. MK collected the data. MK undertook the analysis under the supervision of SW and MO and prepared a preliminary draft of the paper. All authors contributed to the critical revision of the paper and approved the final manuscript for submission. All authors have agreed to be accountable for the accuracy and integrity of the work.

Conflict of interest

None to declare.

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Figure legends:

Figure 1 – Availability of teaching and learning of practical prescribing across UK medical schools

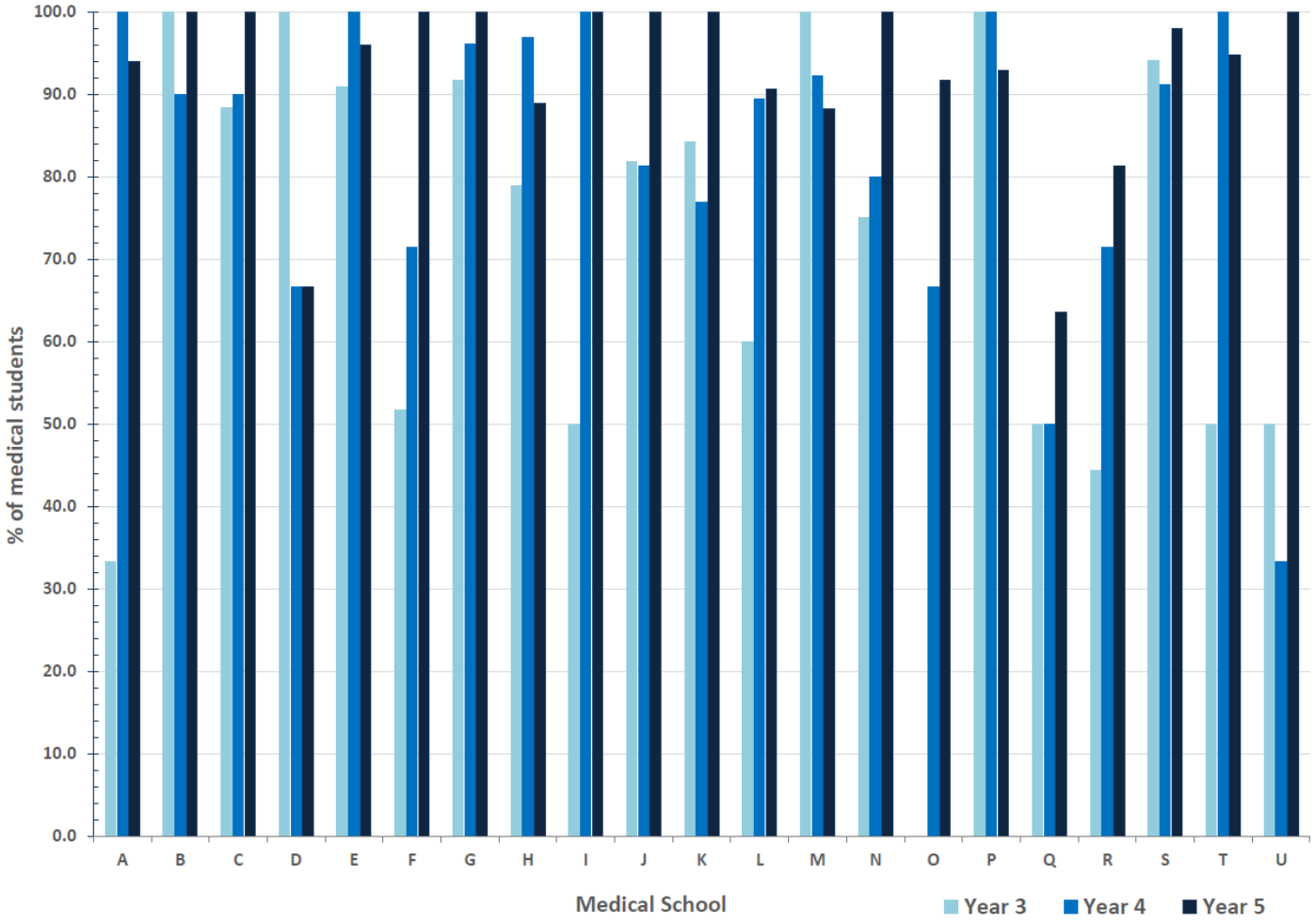

Figure 2 – Integrated versus modular approach to the teaching and learning of practical prescribing in UK medical schools

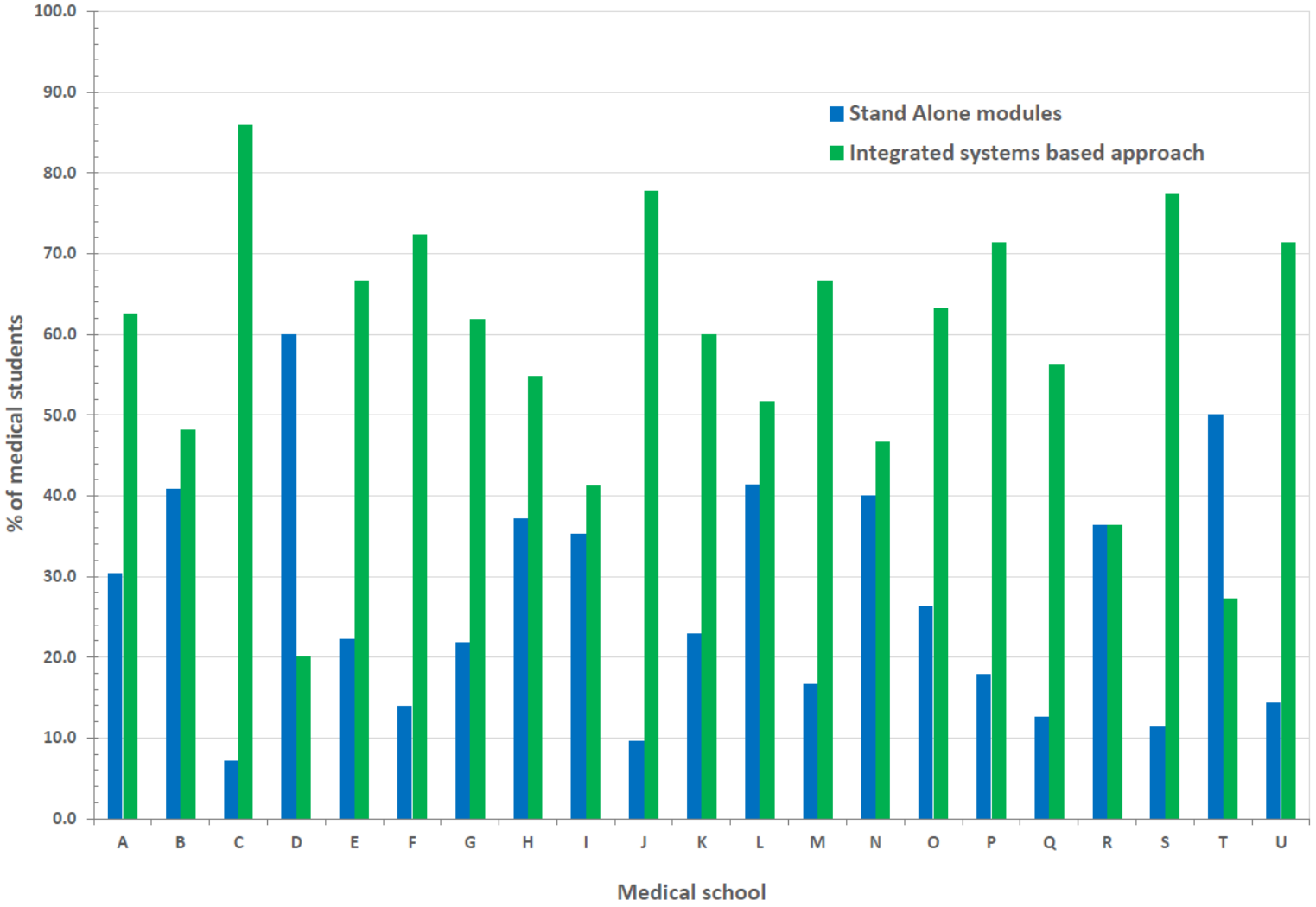

Figure 3 – Methods employed for the teaching and learning of practical prescribing in UK medical schools – medical students' perspective

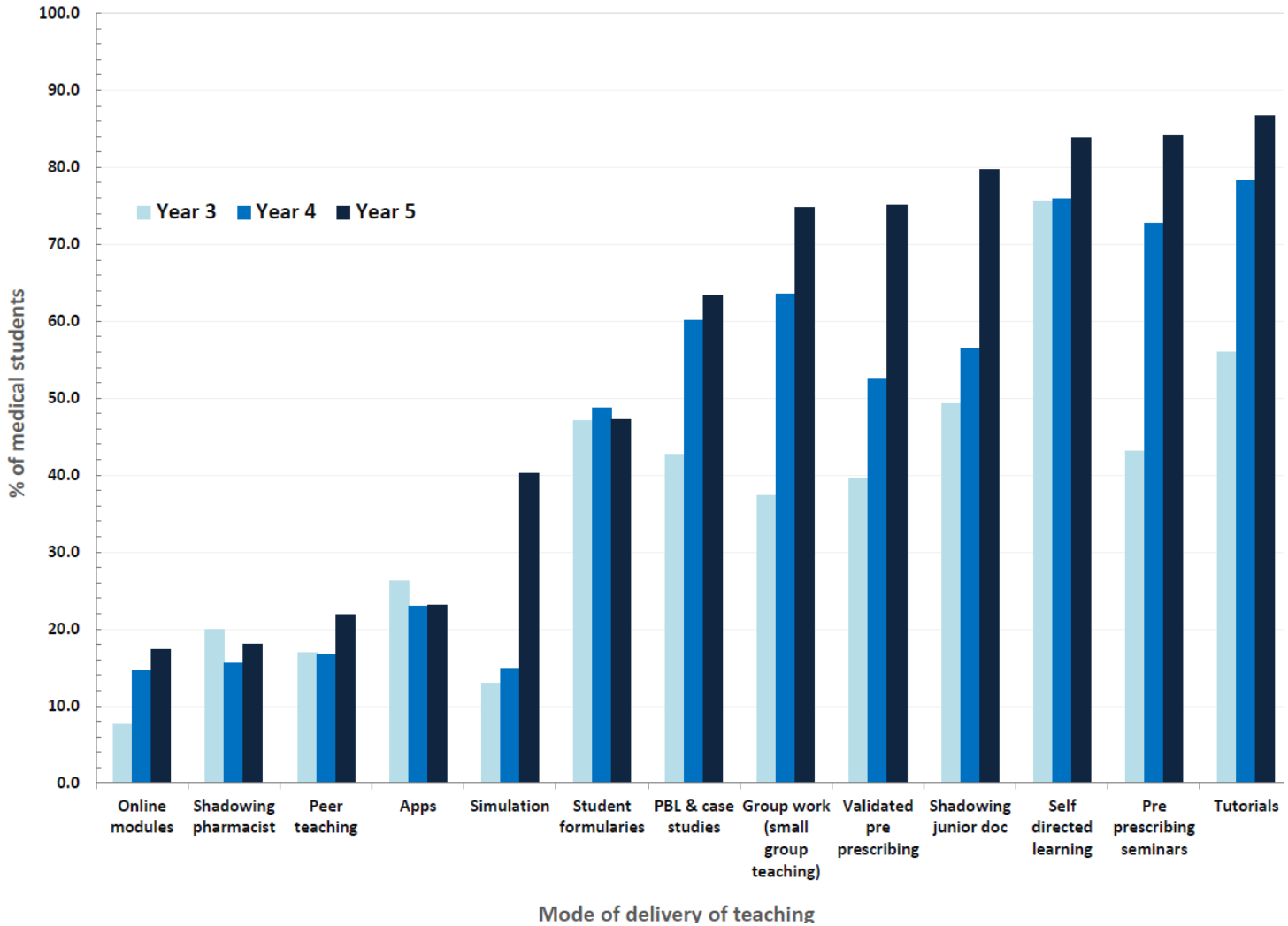

Figure 4 - Students' perceived effectiveness of methods employed in the teaching and learning of practical prescribing

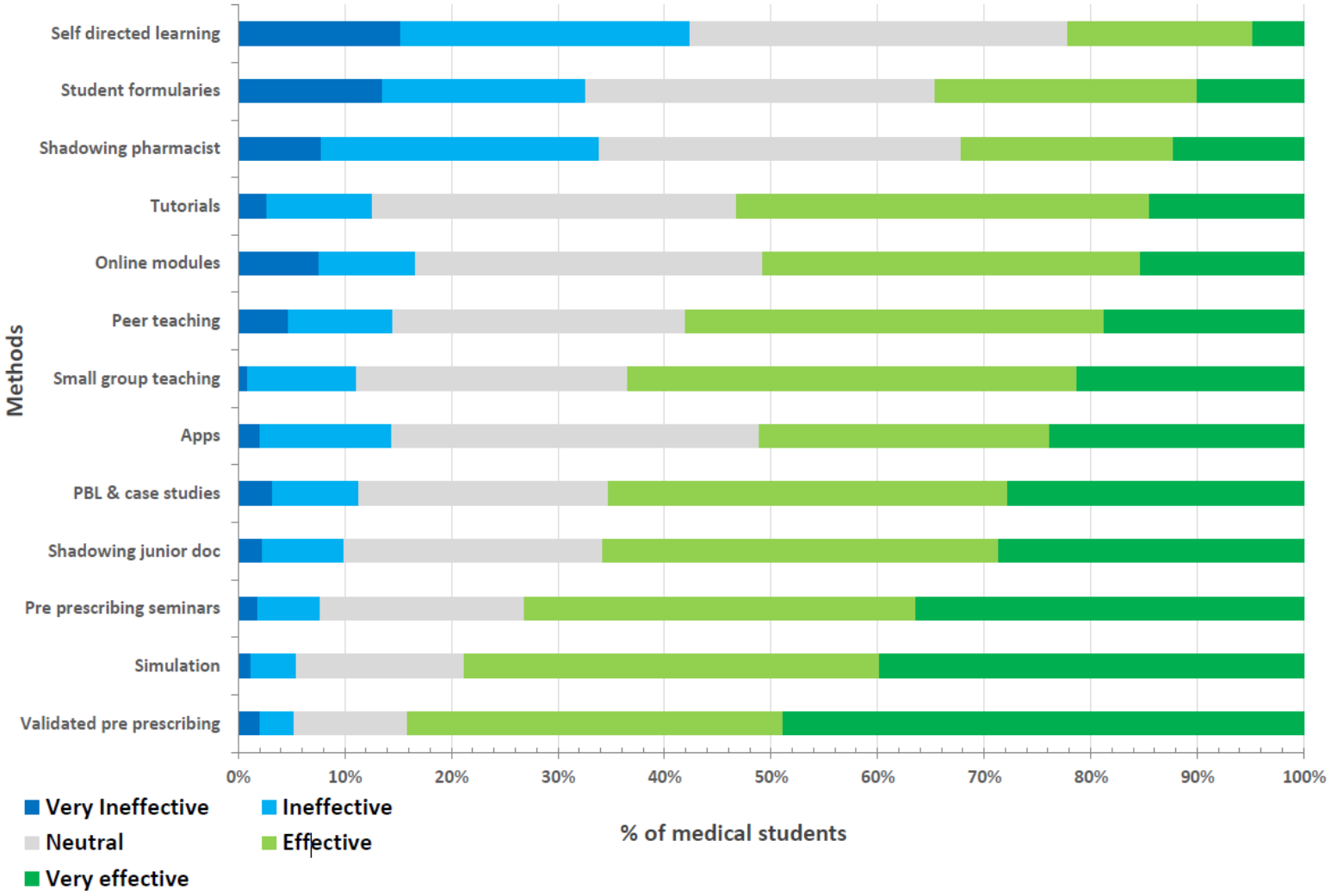

Figure 5 – Students' perceived effectiveness of professional groups in the teaching of practical prescribing in UK medical schools